AF/2821

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of Atty Dkt. 540-311
C# M#
KUMAR Group Art Unit: 2821
Serial No. 09/831,555 Examiner: M. Wimer
Filed: August 14, 2001 Date: November 12, 2004
Title: SCANNING OF ELECTROMAGNETIC BEAMS

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
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☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**
Applicant hereby appeals to the Board of Appeals from the decision dated _____ of the Examiner twice/finally rejecting claims _____ ($ 340.00) $

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☐ Credit for fees paid in prior appeal without decision on merits -$ ( )

☐ A reply brief is attached in triplicate under Rule 193(b) **(no fee)**

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By Atty: Stanley C. Spooner, Reg. No. 27,393

Signature: _____

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

KUMAR

Atty. Ref.: **540-311**

Serial No. **09/831,555**

Group: **2821**

Filed: **August 14, 2001**

Examiner: **M. Wimer**

For: **SCANNING OF ELECTROMAGNETIC BEAMS**

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APPEAL BRIEF

On Appeal From Group Art Unit 2821

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I. REAL PARTY IN INTEREST

The real party in interest in the above-identified appeal is BAE SYSTEMS ELECTRONICS LIMITED by virtue of the Assignment recorded August 14, 2001 at Reel 12095, Frame 0010.

II. RELATED APPEALS AND INTERFERENCES

There are believed to be no related appeals or interferences with respect to the present application and appeal, except the previously noted appeal and the Appeal Brief filed October 20, 2003, mooted by the third (non-final) Official Action of December 30, 2003.

III. STATUS OF CLAIMS

Claims 9-12 stand allowed, with claims 1-6, 13-23, 25 and 27 again rejected in the outstanding third (and non-final) rejection.

IV. STATUS OF AMENDMENTS

After filing the first Appeal Brief in this case, a third (and non-final) official action was mailed. No amendments have been submitted and the rejection of the claims set out in the non-final rejection remains in force.

V. SUMMARY OF THE INVENTION

The present invention relates to the controlling of a radiation beam, and in particular, the controlling of the scanning of a radiation beam in an azimuthal direction.

In communications systems and particularly microwave communication systems it is desirable to be able to steer a microwave communications beam to any position in the azimuthal direction. In the past, such scanning has been accomplished by moving mechanical components so as to focus an antenna in the various azimuthal directions.

It is also known to use an omnidirectional antenna, such as that disclosed in WO 97/29525 to Robertson et al, which provides a very small amount of microwave energy in all directions -- hence the name omnidirectional antenna. Unfortunately, this requires an inordinately large radiation power, since it is dispersed in all directions by the conical reflector. This also has the disadvantage with respect to military communications, in that an enemy can sense the direction of radiation of the communications radiation and target that location.

It is also known to use ferrite blocks with coils. This is illustrated in the patent to Tang et al (U.S. Patent 4,588,994), and as shown in Figure 6, variation in the magnetic field created serves to vary the delay of the radiation propagation speed through the ferrite core, resulting in an electronically steered phased array

antenna. However, there is no beam applied to the ferrite block and instead uniform radiation would be applied resulting in the uniform variation in delay across the block. Of course, such an electronically steered antenna effectively has a scan range of much less than 180° and would in practical terms require at least three, and most probably four, sets of arrays in order to be able to electronically scan a communications beam around a 360° azimuth.

Additionally, it is known to have microwave beam-steering devices such as those described in Brigginshaw (GB 2 253 947 A) in which an output beam is steered and various angles and directions with respect to an input axis. However, there is no suggestion

Appellant found that if a gradient in magnetization is provided across a ferrite body (page 6, line 12 and Fig. 1, element 14), in combination with a phase correcting dielectric layer (page 6, line 14 and Fig. 1, element 20), a beam (page 6, line 11 and Fig. 1, element 12) incident on the body will exit in a direction parallel to the original central axis of the body, but spatially displaced from the central axis. By varying the strength of the magnetic field provided, the azimuthal location of beam departure in an ellipse around the central axis (page 6, line 21 and Fig. 1, element 24) can be controlled. Thus, the exit point of the beam direction can be rotated around the central axis or incident point of the beam on the ferrite body even though the beam direction is parallel with the central axis.

Thus, in a preferred embodiment, a simple conical reflector (page 9, line13 and Fig. 4, element 64) placed above the ferrite body (page 6, line 12 and Fig. 1, element 14) permits the electronic scanning of a microwave communications beam (page 9, line 15 and Fig. 4, element 12) in a 360° azimuthal direction without the requirement of mechanical rotating antennas.

Independent claim 1 is drafted in "means plus function" format (insufficient structure recited in the claim to accomplish the claimed function, i.e., the "steering means"). As a result, in order to properly construe the claim, the Examiner must refer to the corresponding structure disclosed in the specification and equivalents thereto. In the case of the recited "steering means," a portion is described on page 12, lines 2-5 of the specification and identifies the "phase correcting dielectric 20 [which] changes the direction of the beam 12 so that it travels towards the reflector 64 in a direction parallel to the central axis 24." (emphasis added). Thus a proper interpretation of claim 1 requires that it be limited to combinations of elements which include the phase correcting dielectric, and equivalents, which causes the beam to be both offset from and parallel to the central axis.

The invention is characterized by a "**transmission means for transmitting the radiation beam from a radiation source**" and "a steering means" causing "the radiation beam to emerge from the transmission means **spatially offset relative to the central axis** in free space in a known direction" where the

corresponding disclosure of the steering means disclosure teaches that the phase correction dielectric 20 ensures that the transmitted beam is **"in a direction parallel to the central axis."**

VI. ISSUES

Whether claims 1-6 are anticipated by Briggenshaw (GB 2253947).

Whether claims 13-23, 25 & 27 are obvious over Briggenshaw in view of Darbowitch (4740791).

VII. GROUPING OF CLAIMS

The rejected claims stand or fall together and are distinguished over the prior art in the argument portion of this Appeal Brief.

VIII. ARGUMENT

1. Discussion of the References

Brigginshaw (GB 2253947 A) is a patent owned by the present assignee (BAE Systems Electronics Limited is the successor in interest to GEC Marconi Limited). Brigginshaw teaches the use of a microwave beam steering device comprising a block of ferromagnetic material across which a magnetic field gradient is applied. As disclosed in the Abstract, microwave radiation incident on the ferrite block can be deflected in the plane of an applied electromagnetic field. Thus, an input beam can be steered so as to exit the block at an angle to the input

axis, with the angle being adjusted by the location and strength of electromagnetic fields in the block.

However, while this is conventionally known, what is not known or recognized by the Brigginshaw reference is that, not only is the beam somewhat offset from the central axis, it is also non-parallel to the central axis when it leaves, having been "bent" into direction θ. Appellant cannot find and the Examiner does not point out any indication that Brigginshaw teaches the transmission of a beam in a direction parallel to and spatially offset from the central axis.

The uniform radiation emerging from the ferrite blocks in Brigginshaw is not transmitted in a direction parallel to but spatially offset from the central axis as required by the means plus function claim language of the "steering means."

Darbowitch (U. S. Patent 4,740,791) teaches the utilization of a phased array located and mounted on top of a cone having a variable concavity with an elliptic or parabolic reflector located thereabove. During operation the phased array 1 transmits an electronically steered beam onto the elliptic or parabolic skull cap reflector 2, and this beam is then further reflected onto the side of the variably concave conical structure which serves to mount the phased array.

While the Darbowitch combination of elements is certainly a combination which would permit some steering of a resultant beam in a number of different directions, it is believed to be substantially more complex than the elegant solution

provided by Appellant's claimed invention. There appears to be no teaching in Darbowitch of Appellant's claimed steering means which causes radiation to emerge from the transmission means both spatially offset and parallel to the central axis of the transmission means. No such structure has been identified by the Examiner and Appellant can find no such disclosure in its review of the Darbowitch reference.

2. Discussion of the Rejections

Claims 1-6 are alleged to be anticipated under 35 USC §102 in view of Brigginshaw. To the extent the Examiner's rejection is understood, the Examiner appears to believe that all structures recited in appellant's independent claim and the rejected claims dependent thereon are shown in the Brigginshaw reference. Specifically, the Examiner alleges that in Brigginshaw the radiation emerges and "the steering means causes the radiation beam to emerge from the transmission means spatially offset (angle theta) relative to the central axis in free space in a known direction." The Examiner apparently has ignored the claim requirement that the radiation beam must be parallel to the direction of the central axis.

Claims 13-23, 25 and 27 stand rejected under 35 USC §103 as being unpatentable over Brigginshaw in view of Darbowitch. The Examiner presumably applies Brigginshaw in the manner applied previously in the anticipation rejection, and to the extent it is understood, relies upon Darbowitch as allegedly teaching a

conical reflector deployed with a reflective surface "adjacent a face of the body from which the beam emerges." The Examiner apparently contends it would have been obvious to employ such a reflector in the system of Brigginshaw.

3. The Errors in the Final Rejection

There are at least three significant errors in the Final Rejection and they are summarized as follows:

(a) No reference teaches a steering means causing a "spatial offset relative to the central axis" with the beam parallel to the central axis;

(b) Brigginshaw 's offset inclined beam teaches away from the structure providing the claimed beam which is both offset and parallel; and

(c) The Examiner has failed to provide any reason for combining elements taken from Brigginshaw and Darbowitch.

(a) No reference teaches a steering means causing a "spatial offset relative to the central axis" with the beam parallel to the central axis

As noted above in the description of the present invention and as recited in appellant's independent claim 1, a "beam" is applied to the transmission means and not a uniform radiation. The steering means is a structure which causes "the radiation beam to emerge from the transmission means spatially offset relative to the central axis in free space in a known direction."

However, one element of independent claim 1 is drafted in "means plus function" format (insufficient structure recited in the claim to accomplish the claimed function, i.e., the "steering means"). As a result, in order to properly construe the claim, the Examiner must refer to the corresponding structure disclosed in the specification and equivalents thereto. In the case of the recited "steering means," a portion is described on page 12, lines 2-5 of the specification and identifies the "phase correcting dielectric 20 [which] changes the direction of the beam 12 so that it travels towards the reflector 64 in a direction parallel to the central axis 24." (emphasis added). Thus a proper interpretation of claim 1 requires that it be limited to combinations of elements which include the phase correcting dielectric which causes the beam to be both offset from and parallel to the central axis.

The Court of Appeals for the Federal Circuit has noted in the case of *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 USPQ 481, 485 (Fed. Cir. 1984) that "[a]nticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim."

The threshold question is whether Brigginshaw contains any teaching of a phase correcting dielectric or equivalent thereto which changes the direction of the beam to be "parallel with the central axis" (while remaining offset as recited). The

answer is there is no such structure disclosed in Brigginshaw nor is any such structure alleged by the Examiner to be disclosed in Brigginshaw. There is no allegation that Darbowitch teaches the creation of any beam which is offset to and "parallel to the central axis."

Thus, neither Brigginshaw nor Darbowitch can anticipate claim 1 nor any claim dependent thereon.

(b) Brigginshaw 's offset inclined beam teaches away from the structure providing the claimed beam which is both offset and parallel

As noted above in the discussion of the Brigginshaw reference teaching, it fails to teach that the beam is both offset and parallel and indeed teaches that the beam leaves the ferrite block in a non-parallel direction (unless no electromagnetic field is applied, in which case the beam leaves on the central axis, not in a direction parallel to the central axis). Thus, the Brigginshaw reference not only fails to teach the Appellant's claim 1 embodiment requiring a "steering means" which changes the beam to be both offset and parallel, it actually suggests that there is value in having the beam both offset and non-parallel, i.e., the direct opposite of Appellant's claim 1 structure.

The Federal Circuit has also opined that it is "error to find obviousness where references 'diverge from and teach away from the invention at hand'." *In re Fine*, 5 USPQ2d 1596, 1599 (Fed. Cir. 1988).

There is simply no doubt that Brigginshaw clearly teaches a structure which at best provides either an output beam which is not offset and is parallel (in the case of no applied electromagnetic field) or one which is offset and non-parallel (in the case of the energized electromagnetic field). In neither instance does Brigginshaw disclose or render obvious Appellant's claimed steering means which, as discussed in Appellant's specification, changes the direction of the beam so that it is both offset and parallel to the central input axis. Thus, Brigginshaw would clearly lead one of ordinary skill in the art away from Appellant's claimed combination.

(c) The Examiner has failed to provide any reason for combining elements taken from Brigginshaw and Darbowitch

Not only do the Brigginshaw and Darbowitch references fail to teach Appellant's claimed invention, the Examiner has failed to provide any motivation or reason for combining elements taken from the Brigginshaw and Darbowitch references.

Specifically, the Examiner is reminded that the Court of Appeals for the Federal Circuit has held that "the PTO has the burden under Section 103 to establish a *prima facie* case of obviousness." With respect to the combination of references, the Federal Circuit has also held that "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.*. Here the

Examiner has provided no support for the allegation of it being obvious to combine these references.

Neither Brigginshaw nor Darbowitch contain any teaching of Appellant's claimed steering means. Additionally, there is no disclosure in either Brigginshaw or Darbowitch which would suggest adding such a steering means to the Brigginshaw ferrite block. Because the burden is on the Examiner to demonstrate how and where there is some motivation for combining disparate elements from the Brigginshaw and Darbowitch references, and because the Examiner has failed to meet this burden, there is simply no *prima facie* case of obviousness and any further rejection thereunder is respectfully traversed.

Finally, even if it were somehow obvious to combine the Brigginshaw reference with the Darbowitch reference, and assuming the Examiner's suggestion that Brigginshaw teaches an offset beam, the use of the offset beam without the beam being parallel to the central axis may not even be compatible with the Darbowitch teaching of a reflector. Thus, even the combination of Brigginshaw and Darbowitch would not necessarily provide a device for controlling the direction of a radiation beam.

As a result of the above, the Patent Office has misinterpreted the teachings in both Brigginshaw and Darbowitch and has failed to provide any suggestion for

combining elements of these two disclosures. Accordingly, the Examiner has simply failed to set out a *prima facie* case of obviousness.

IX. CONCLUSION

As discussed above, none of the prior art references teach appellant's claimed steering means for providing a beam which emerges "spatially offset relative to the central axis" and, as required by the specification, which is also "parallel to the central axis." The Examiner combines two references, one of which teaches away from the "parallel" limitation and the other teaches a different scanning system. The Examiner also fails to provide any reason or motivation for combining elements of the two references. Even if the references were combined, the combination does not disclose the structural element which provides the "parallel to the central axis" feature of the independent claim 1. Accordingly, the Examiner has failed to support the anticipation rejection, as well as establish a *prima facie* case of obviousness under 35 USC §103.

In view of the above, the rejections of claims 1-6, 13-23, 25 and 27 are clearly in error and reversal thereof by this Honorable Board is respectfully requested.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: _____

Stanley C. Spooner
Reg. No. 27,393

SCS:kmm
Enclosures
Appendix A - Claims on Appeal

APPENDIX A

Claims on Appeal

1. A device for controlling the direction of a radiation beam, the device comprising:-

transmission means for transmitting the radiation beam from a radiation source; and

steering means for steering the radiation beam;

wherein the transmission means comprises a body of magnetic material having a central axis which forms an aperture through which the radiation beam passes, the central axis being parallel to and coincident with the direction of the radiation beam prior to incidence on the transmission means;

and wherein the steering means causes the radiation beam to emerge from the transmission means spatially offset relative to the central axis in free space in a known direction.

2. A device according to claim 1, wherein the beam is offset relative to the central axis and steered thereabout so as to define as angle θ between the central axis and the emergent direction.

3. A device according to claim 1, wherein the steering means comprises magnetic means.

4. A device according to claim 3, wherein the magnetic means applies a gradient in magnetisation across the aperture.

5. A device according to claim 4, wherein the gradient in magnetisation occupies a plane which is not perpendicular to the central axis.

6. A device according to claim 4, wherein the gradient of magnetisation rotates about the central axis.

13. A device according to claim 1, further comprising a reflective surface located adjacent a face of the body from which the beam emerges.

14. A device according to claim 13, wherein the reflective surface comprises a cone having its apex facing the face and its central axis coincident with the central axis.

15. A device according to claim 1, wherein the beam is swept through 360° in a plane which is perpendicular to the central axis.

16. A device according to claim 1, wherein the beam comprises microwave radiation.

17. A device according to claim 16, wherein the microwave radiation is millimetric radiation.

18. A device according to claim 17, wherein the radiation is at Ka band (26.5 to 40GHz).

19. A device according to claim 17, wherein the radiation is at W-band (75 to 110GHz).

20. A communications unit incorporating a device according to claim 1, and which includes radiation receiving means, modulation and demodulation means for modulating and demodulating information onto and from the radiation beam.

21. A communications system comprising a plurality of communications units according to claim 20.

22. A device, as in claim 1, characterised in that the beam of radiation is at Ka band (26.5 to 40GHz).

23. A device, as in claim 1, characterised in that the beam of radiation is at W-band (75 to 110GHz).

25. A communications unit incorporating a device as in claim 1 including, radiation receiving means and modulation and demodulation means for modulating and demodulating information onto and from radiation.

27. A communications system comprising a plurality of units as in claim 25.